

SECTION 41

HIGHWAY BRIDGE EVALUATION PROGRAM

1.41.1 GENERAL

For a comprehensive treatment of the subject, reference is directed to the Bridge Inspector's Training Manual 90 published in 1991 by the U.S. Department of Transportation, Federal Highway Administration.

Note: Values in parentheses, or otherwise indicated, are in customary U. S. Units.

1.41.2 EVALUATION CRITERIA

The 1994 AASHTO Manual for Condition Evaluation of Bridges shall govern inspection and rating of existing bridges with the following amendments and modifications:

1. (Page 69) 6.7.2 Rating Live Load:

In addition to the MS18 (HS 20) truck, ratings shall be determined for the Type 3, NJDOT 3S2 and Type 3-3 legal load trucks.

2. (Page 71) 6.7.3 Distribution of Loads:

In rating the fascia or curb stringers, the distribution of truck loads to these members shall be based on a simple beam action instead of the AASHTO formula. For the above members taking no truck loads, give only the dead load and sidewalk live load stresses (no vehicle ratings).

3. (Page 74) Figure 7.4.3.1 Typical Legal Loads Used for Posting:

Substitute the loadings for the NJDOT Type 3S2 truck shown on Page 1.41-3 of this Manual for the values shown for the Type 3S2 truck.

4. (Page 53) Table 6.6.2.1-1 Inventory Rating Allowable Stresses:

Substitute the values shown below for the allowable stresses shown in the subject table.

Steel-Unknown

Allowable Inventory Rating Stress

Prior to 1905	99.97 MPa instead of 96.53 MPa	(14,500 psi instead of 14,000 psi)
1905 to 1936	113.76 MPa instead of 110.32 MPa	(16,500 psi instead of 16,000 psi)

5. (Page 66) 6.6.2.4 Concrete:

Under Section 6.6.2.4.1 Bending, the allowable stresses for compression due to bending

should be $0.40 f_c$ for inventory and $0.55 f_c$ for operating ratings provided that the field investigation indicates that the concrete is sound and that contract plans and controls specified and furnished compressive strengths of 16.55 MPa (2,400 psi) or more.

6. (Page 67) 6.6.2.5 Prestressed Concrete

The allowable stress in the precompressed tensile zone of prestressed concrete members is specified in the AASHTO Design Specifications (Article 9.15.2.2). For calculating inventory rating by the working stress or load factor (serviceability) methods, an allowable tension stress of $3 \sqrt{f_c}$ shall be utilized for members with bonded reinforcement.

7. (Page 80) Appendix A3 Live Load Moments on Longitudinal Stringers or Girders:

Substitute the values shown for the Type 3S2 truck with the values for the NJDOT Type 3S2 truck shown in the table on Page 1.41-3.

It should be noted that the values shown for the Type 3S2 truck in Appendices A4, A5, A6, A7 and A9 require revisions to conform to the NJDOT Type 3S2 truck.

8. General Comments:

The allowable stresses listed in Tables 6.6.2.1-2 and 6.6.2.1-1 (for Operating and Inventory Ratings respectively) are not absolutes. They are intended to provide general guidance. These allowable stresses may be modified if other values can be justified by test results, more detailed information of the materials, more refined structural analysis, consideration of traffic types and volumes, frequency of interim inspection and other related factors.

These given allowable stresses do not necessarily include all the allowable stresses required for a bridge rating. Values not given in these instructions should be obtained from appropriate sources (e.g. original design plans and specifications; current and past editions of the Standard Specifications for Highway Bridges, AASHTO and AASHTO; historical records; ASTM Specifications; etc.).

REVISIONS TO APPENDIX A3
Live Load Moments on Longitudinal Stringers or Girders
Live Load Moments per Wheel line

NJDOT Type 3S2 Truck

Span C/C		Without Impact		With Impact		Span C/C		Without Impact		With Impact	
Meters	Feet	kN.m	ft. kips	kN.m	ft. kips	Meters	Feet	kN.m	ft. kips	kN.m	ft. kips
1.5	5	14.4	10.6	18.7	13.8	9.8	32	182.1	134.3	236.9	174.7
1.8	6	17.4	12.8	22.5	16.6	10.4	34	197.8	145.9	257.2	189.7
2.1	7	20.6	15.2	26.7	19.7	11.0	36	213.3	157.3	277.3	204.5
2.4	8	25.9	19.1	33.8	24.9	11.6	38	228.9	168.8	297.6	219.5
2.7	9	31.3	23.1	40.8	30.1	12.2	40	244.6	180.4	317.9	234.5
3.0	10	36.9	27.2	48.0	35.4	12.8	42	259.8	191.6	338.0	249.3
3.4	11	42.4	31.3	55.2	40.7	13.4	44	275.6	203.3	357.3	263.5
3.7	12	48.0	35.4	62.4	46.0	14.0	46	291.2	214.8	376.4	277.6
4.0	13	53.7	39.6	69.7	51.4	14.6	48	306.7	226.2	395.4	291.6
4.3	14	59.2	43.7	77.0	56.8	15.2	50	331.0	244.1	425.5	313.8
4.6	15	64.9	47.9	84.5	62.3	15.8	52	357.7	263.8	458.5	338.2
4.9	16	70.6	52.1	91.8	67.7	16.5	54	384.1	283.3	491.5	362.5
5.2	17	76.3	56.3	99.1	73.1	17.1	56	410.8	303.0	524.3	386.7
5.5	18	81.9	60.4	106.6	78.6	17.7	58	437.7	322.8	557.2	411.0
5.8	19	87.6	64.6	113.9	84.0	18.3	60	464.0	342.2	589.6	434.9
6.1	20	93.4	68.9	121.3	89.5	21.3	70	598.2	441.2	751.5	554.3
6.4	21	99.1	73.1	128.8	95.0	24.4	80	732.5	540.3	911.2	672.1
6.7	22	104.8	77.3	136.3	100.5	27.4	90	867.2	639.6	1068.8	788.3
7.0	23	112.3	82.8	145.9	107.6	30.5	100	1002.1	739.1	1224.7	903.3
7.3	24	120.0	88.5	155.9	115.0	36.6	120	1272.0	938.2	1531.7	1129.7
7.6	25	127.7	94.2	166.1	122.5	42.7	140	1542.4	1137.6	1833.5	1352.3
7.9	26	135.6	100.0	176.1	129.9	48.8	160	1813.0	1337.2	2131.1	1571.8
8.2	27	143.3	105.7	186.3	137.4	54.9	180	2083.5	1536.7	2425.0	1788.6
8.5	28	151.0	111.4	196.5	144.9	61.0	200	2354.4	1736.5	2716.5	2003.6
8.8	29	158.9	117.2	206.6	152.4	76.2	250	3031.6	2236.0	3435.9	2534.2
9.1	30	166.6	122.9	216.7	159.8	91.4	300	3709.8	2736.2	4146.0	3057.9

1.41.3 EVALUATION SURVEY REPORT FORMAT - A -

The report of the results of a first cycle bridge survey and rating of an existing bridge, performed by or for the Department, shall adhere to the following format:

- (A). **REPORT COVER SHEET:** The report's cover sheet shall include the bridge number, name,

route number, municipality, county, bridge survey cycle number and the month and the year of the bridge survey (see attached sample).

The cover sheet colors for various cycles shall be: First cycle: White; Second cycle: Pink; Third cycle: Green; Fourth cycle: Yellow; Fifth cycle: Orange; Sixth cycle: Red; Seventh cycle: Blue; Eighth cycle: White; Ninth cycle: Pink; Tenth cycle: Green, etc.

The report shall be bound using a standard 3-hole punch type binding.

- (B). **LETTER OF TRANSMITTAL (CONSULTANT PROJECTS ONLY):** The letter of transmittal shall be addressed as follows (see attached sample):

Manager, Structural Evaluation and Bridge Management
New Jersey Department of Transportation
1035 Parkway Avenue, PO Box 600
Trenton, New Jersey 08625-0600
ATTN: Project Manager (Name)

Re: Bridge Survey and Rating of ("Bridge Number, Name, BR-NBIS/BR-Z-NBIS () and Route Number").

In addition, the letter should include the date of the agreement with the New Jersey Department of Transportation and any disclaimer and/or restrictions on the information contained in the report and its use and the due date for the submission of the particular report (preliminary or final). Also, include a Quality Assurance Statement for the structure.

- (C). **TABLE OF CONTENTS:** One page indicating items 1 thru 11 in order shown as follows and providing the page number in the report on which each item starts. All pages in the report shall be numbered (i.e. Cycle No.- Page No.) at the bottom and centered.

	<u>Page No.</u>
1. Maps.....	
2. Structural Data	
3. Controlling Ratings	
4. Conclusions and Recommendations	
5. Historical Information.....	
6. Bridge Description	
7. Appendix 1 - a. Structure Inventory & Appraisal Sheets	
b. Pontis Data.....	
c. Seismic Data	
8. Appendix 2 - Computations	
9. Appendix 3 - Drawings, Soundings and Photographs.....	
10. Appendix 4 - Field Notes with CADD Sketches	
11. Appendix 5 - Underwater Inspection Report/ Other Special Report if applicable.....	

1. **Maps:** Two maps, are required: one "General Location Map" and the other, a more detailed and specific "Local Map". Each map shall be on a separate 210 by 297 millimeter (8 1/2 by 11 inches) sheet.

- a. **General Location Map:** For **State** owned bridges a map of the entire state of New Jersey, scale approximately 1: 1 000 000 "pin pointing" the location of the structure being reported on (by bridge number, name and route number). This map should show county boundaries and names, principal cities, main roads (Interstate, U.S., State and Toll Roads) and the roads or the road and waterway involved in the structure being reported.

For reports on **County** or **Municipality** owned bridges, the general location map shall be of those territories and of a suitable scale.

- b. **Local Map:** A current U.S.G.S map of the immediate vicinity of the "reported" structure; scaling 1: 20 000 with the structure centered on the page. Include roads, railroads, waterways, county and township names and a north arrow. Features intersecting the bridge should be clearly labeled.

2. **Structural Data:** A summary of findings shall be included as per the attached format. The items in this format are self-explanatory, however, further explanation for some items is provided as follows:

- a. **Component/Material:** The components shall be as listed in Format "A" only. Type of material used for majority of construction shall be given below the component in the same vertical column. Delete the components which are not applicable.
- b. **Condition Rating:** The condition rating of various components shall be the overall rating of the component as per the current Recording and Coding Guides for the Structural Inventory and Appraisal of Bridges by FHWA & NJDOT and should be consistent with the ratings given on field notes and the SI&A sheet.
- c. **General Remarks:** Summarize the significant defects and give a brief account of what was found during the bridge survey, as it relates to the structural integrity of the bridge. Defects for which repairs are recommended must be mentioned. Photos of these defects should be referenced in this section.

The Deck section should include the condition of the top and underside of the deck, sidewalks, deck joints, bridge railing, etc. For reinforced concrete decks give the percentage of spalled area (open or concrete/asphalt patched) and estimated contaminated area (underdeck).

The Superstructure section should include the condition of main load carrying members and diaphragms (include percent loss of section if any) and the bearings.

The Substructure section should include the condition of the abutments, pier(s), retaining walls, etc., and information on scour or undermining.

The Safety Features section should include the adequacy of bridge railing and approach guide rails.

The Deck Geometry section should comment on the adequacy of the traffic

lanes and shoulder widths on the bridge. Also, comment on the continuity of the approach roadway (lanes and shoulders) across the bridge.

Field measured minimum clearances and where they occur should be provided (minimum vertical clearance above and below, and lateral underclearance left and right as per SI&A coding requirements). For bridges over waterways, horizontal and vertical clearances of the major waterway opening should also be given as per field measurements.

3. **Controlling Ratings:** The ratings should include the controlling member and controlling Inventory and Operating Ratings of the bridge. Also, comment on why the ratings are low, if it is the case and give the maximum calculated percent overstress for the operating or inventory ratings of the critical live load only (for prestressed beams overstressed in tension, give tensile stress in concrete). If the bridge is load posted, state so, giving the posted weight limit (this should be referenced to photos clearly showing the posted weight limits). Also, when applicable, if the inventory ratings are below the weight of the legal trucks, state that load posting is not required if the operating ratings are high.
4. **Conclusions and Recommendations:** Conclusions resulting from the bridge evaluation survey regarding the adequacy (structural, alignment, clearances, etc.) of the bridge should be given here. Also, include possible explanation of the causes of any inadequacies found. If the bridge is speed posted, state so, giving the posted speed limit and refer to photos included to clearly show the posted speed limit.

For bridges over waterways, include a statement relative to the scour potential of the bridge based on the Bridge Scour Evaluation. The statement should specify if the bridge is scour critical or not based on the Bridge Scour Evaluation. If the bridge has not yet been evaluated, the Priority Category as determined in the Bridge Scour Evaluation should be specified. If the Prioritization Category is 2 or less, the statement should include which low ratings (2 or less) led to this rating. Where the bridge has not yet been evaluated for scour potential, include a statement that the bridge is or is not potentially scour critical based on engineering judgment along with the reasons for this determination.

Make specific recommendations for safety improvements, major repair work (i.e. structure rehabilitation and/or replacement, raising superstructure, bridge widening, etc. to correct Structurally Deficient/ Functionally Obsolete conditions) and other repair work to correct significant defects, deterioration and inadequacies found during this bridge survey. The recommendations should be specific about the location of defects and the methods of repair. The recommendations for other repair work should be listed in the order of priority. Each recommendation should be referenced to the photos. For major repair/ rehabilitation work, provide cost estimates, however, for other repair work, provide quantities only.

In addition, list all areas of deterioration or structural members which should be

inspected at frequencies of less than two years and indicate the inspection cycle in months for each area or member. Be very specific about locations to be inspected.

5. **Historical Information:** If available, this information should include when and under what agency the structure was built; when and by whom any subsequent alterations were made, their nature and extent, etc. Historical significance of the structure, if applicable, should be indicated.
6. **Bridge Description:** Furnish a brief description of the structure. Include the type of construction, materials in the deck, superstructure and substructure components, and important dimensions. Also, comment on the substructure foundation design if based on FHWA Hydraulic Engineering Circular (HEC-18). A more detailed description should be given if plans are not available.
7. **Appendix 1 - Structure Inventory & Appraisal Sheet/PONTIS/Seismic Data:** This section should contain a 210 by 297 millimeter (8 ½ by 11 inches) computer print out of the "Structure Inventory and Appraisal Sheet" (two or more sheets for structures carrying highways over highways). This sheet will be developed by the Department from the Computer Input sheets submitted with the preliminary report and coded in accordance with the current FHWA Recording and Coding Guide for the Inventory and Appraisal of the Nations Bridges and Recording and Coding Guide for the Structure Inventory and Appraisal of New Jersey bridges.

Also, include a computer print out of the Elemental Inspection and Seismic data developed from the computer input sheets submitted with the preliminary report and coded in accordance with the current PONTIS Manual. For the final report, include only the computer printout (supplied by the State).

Examples of SI&A/Pontis/Seismic data forms are included in Format A.

8. **Appendix 2 - Computations:** In this section, include computations of ratings for various major bridge components. The ratings shall be computed in accordance with the current AASHTO "Manual for Condition Evaluation of Bridges" (as modified in this Manual) and all current AASHTO interims. Include a summary as the first page of the computations listing all ratings with references and the allowable stresses used (see attached samples). Also, include the name of any rating computer program used and indicate any noteworthy assumptions made (such as section loss location(s), top or bottom flange in tension or compression controls, etc.). Include a CADD drawing, 210 by 297 millimeters (8 ½ by 11 inches), showing the location of the controlling member and other members rated in the summary.
9. **Appendix 3 - Drawings, Soundings & Photographs:** A plan sketch indicating the direction and location of the photographs should be included. Bridge drawings (plan, elevation and cross section) etc. and color photographs (35mm print) plus color slides of unique defects should be included in this section of the report. Also, sounding sketches done in accordance with the current edition of the "Underwater Inspection and Evaluation of New Jersey Bridges Guidelines Manual" should be included.

Photographs of both full elevations and plan views, upstream and downstream views (if applicable), all significant defects, any repairs made and any special equipment used (Snooper, cherry picker, maintenance and protection of traffic, special ladders, etc.) should be included in the report. The photographs should be placed in the report in the following order: Elevations, Plan Views, Stream Views, Deck, Approaches, Superstructure, Substructure, Channel, Safety Features and Special Equipment.

10. **Appendix 4 - Field Notes:** Detailed clear hand written field notes using the Department's current Field Note Format for the type of structure being surveyed and/or CADD field sketches should be included as back-up data for the report. Include a 297 by 420 millimeter (11 by 17 inches) CADD drawing showing the deck and approach plan and elevation showing lateral and vertical clearances, span lengths, highway safety, lane, shoulder and sidewalk widths, curb to curb widths, median barrier, etc. Field notes should include measurements taken during the bridge survey and Pontis Core element condition evaluation data. A sample of the current Field Note forms and CADD sketches can be obtained from the Structural Evaluation and Bridge Management Unit.

11. **Appendix 5 - Underwater Inspection:** In this section, include the diver's inspection report (if applicable) done in accordance with the current edition of the "Underwater Inspection and Evaluation of New Jersey Bridges Guidelines Manual". Also, include as additional appendices any special reports such as fatigue analysis, ultrasonic testing, chemical analysis, coupon testing, hydraulic analysis, geotechnical streambed analysis, etc. Provide photographs showing the equipment used.

Sample Letter of Transmittal
(Preliminary/Final Report)

_____, Manager
Structural Evaluation and Bridge Management
New Jersey Department of Transportation
Engineering and Operations Building
1035 Parkway Avenue
PO Box 600 - 5th Floor
Trenton, New Jersey 08625-0600

Attn: Mr. _____, Project Manager

Evaluation Bridge
Survey & Rating of
Structure No.
Route No.
Structure Name
BR-NBIS ()

Gentlemen:

In accordance with our Agreement No. BI with the New Jersey Department of Transportation, dated _____, we are pleased to submit this PRELIMINARY REPORT/ FINAL REPORT for the above referenced bridge. A scanned and indexed report will be submitted on CD by a separate transmittal.

The report covers the results of a field inspection of the structure and recommendations for repair or replacement of major defects found. The inspection was made according to generally recognized standards and procedures, but it is not implied that all defects were or could have been disclosed by this inspection.

The inspection findings and recommendations in this report were reviewed to ensure a proper level of quality and uniformity. The report adheres to State practices for inspections and current NJDOT standards.

Very truly yours,

Consultant XYZ

Sample - For State Bridges
(Consultant Report Cover Sheet)

NEW JERSEY DEPARTMENT OF TRANSPORTATION

BRIDGE EVALUATION SURVEY REPORT OF THE

Structure No. 0226-152

Route I-80

South Summit Avenue over I-80

Hackensack Township

Bergen County

CYCLE NO. 1

AUGUST, 1996

XYZ ENGINEERS, INC.

100 Lincoln Place

East Orange, New Jersey 07018

(FORMAT "A")

NEW JERSEY DEPARTMENT OF TRANSPORTATION
STRUCTURAL EVALUATION AND BRIDGE MANAGEMENT
EVALUATION BRIDGE SURVEY REPORT

CYCLE NO. 1

STRUCTURAL DATA

Bridge No. _____ Year _____ Built: _____
Reconstr/Widening: _____

Route No. _____ KM (Mile) Post _____ Length: _____ Width : _____

Name: _____ Date _____ of _____ This _____ Eval.: _____

By: _____

Date _____ of _____ FCM/Pin _____ Hanger _____ Insp.: _____

By: _____
(Only When Special Inspections are applicable)

Municipality: _____

Structure Type: _____ County: _____

Special _____ Equipment _____
Used: _____
(Include Photo)

Date _____ of _____ Underwater
Insp: _____

Date _____ of _____ Special
Testing: _____

Date _____ of _____ Electr./Mech.
Insp.: _____
(Movable Bridges Only)

Overall Condition: _____ Scour Critical: yes/no
(If yes give reasons in Conclusions Section)

Component/ Material	Cond. Rating	General Remarks
------------------------	-----------------	-----------------

DECK/TOP OF
ROADWAY

____ APPROACHES

Component/
Material

Cond.
Rating

General Remarks

SUPERSTRUCTURE

SUBSTRUCTURE

CHANNEL/
WATERWAY/
COUNTERMEASURES

SAFETY
FEATURES

DECK GEOMETRY

UTILITIES

The minimum vertical underclearance is _____ under _____.

The lateral clearance are: Left: _____ Right: _____

For waterways include horizontal and vertical clearances of the main channel span.

CONTROLLING RATINGS

Computer Program Used: _____

Based on the *load factor method of analysis, the following load ratings have been computed:

Truck Type kN (Tons)

Controlling	<u>MS18(HS20)</u>	<u>3</u>	<u>3S2</u>	<u>3-3</u>
Member	320.3	222.4	355.86	355.86
	(36)	(25)	(40)	(40)

End Floorbeam	Inventory Ratings	XX	XX	XX	XX
Interior Stringer	Operating Ratings	XX	XX	XX	XX

The inventory/operating ratings are low due to (give explanation/reasons).

*Working Stress or load factor/working stress could also be substituted depending on the method used to calculate the ratings.

CONCLUSIONS AND RECOMMENDATIONS:

The overall condition of the structure is _____ due to _____.

((Provide a brief description and location of the fracture critical members or pin hanger details (specify when FCM's are internally redundant - i.e., riveted)).

A. If the bridge is Structurally Deficient or Functionally Obsolete - Major work required:

Due to the condition of the _____ and/or inadequate _____, we recommend the following repairs and/or remedial action:

(List recommendations for major repair work with quantities and cost estimates)

In the interim, until the structure is replaced/widened/lengthened/raised/etc., the following repairs/rehabilitation should be made to retard further deterioration, preserve the structural integrity of the bridge, improve safety and extend its useful life:

(List recommendations for interim repair work with quantities only)

Or if the primary recommendation [major work] is for rehabilitation only:

We also recommend that the following interim repairs be made, until the rehabilitation is implemented, to retard further deterioration, preserve the structural integrity of the bridge, improve safety and extend its useful life:

(List recommendations for interim repair work with quantities only)

If the bridge is Scour Critical - Include recommendations for providing countermeasures if not already provided or if monitoring devices are required or installed.

B. If the bridge is not Structurally Deficient or Functionally Obsolete - No major work required:

We recommend that the following repairs be made to retard further deterioration, preserve the structural integrity of the bridge, improve safety and extend its useful life:

(List recommendations for other repair work with quantities only)

repairs with quantities and cost estimate.

For **Other Repairs** include quantities only.

Note: The following area(s) or structural member(s) should be inspected on an interim basis at the frequency indicated:

A.

B.

C.

FORMAT A - When ratings are calculated by both load factor and working stress

Structure No.: _____ Project: _____

Name: _____

Rated By: _____ Date: _____ Checked By: _____ Date: _____

SUMMARY OF RATING

The Load Factor and Working Stress ratings, computed in the _____ and updated in the _____ cycle report in accordance with the FHWA directive dated November 1993 and AASHTO Manual for Condition Evaluation of Bridges, 1994, are as follows:

Note:

Include details of the analysis such as section losses, any assumptions made and the computer program used, etc.

Computer Program Used: _____**Allowable Stresses** MPa (Psi)

<u>Material</u>	<u>Yield</u>	<u>Inventory</u>	<u>Operating</u>
Concrete	XX (f_c)	XX	XX
Reinforcing Steel	XX	XX	XX
Structural Steel	XX	XX	XX

Rating - kN (Tons)

Member	<u>Truck Type</u>	<u>Load Factor</u>		<u>Working Stress</u>	
	<u>kN (Tons)</u>	<u>Inventory</u>	<u>Operating</u>	<u>Inventory</u>	<u>Operating</u>
	Type MS18 - 320.3 kN (HS 20 - 36 T)	XX	XX	XX	XX
	Type 3 - 222.4kN (25 T)	XX	XX	XX	XX
	Type 3S2 - 355.86kN (40 T)	XX	XX	XX	XX
	Type 3-3 - 355.86kN (40 T)	XX	XX	XX	XX

FORMAT B - When ratings are calculated by load factor only

Structure No.: _____ Project: _____

Name: _____

Rated By: _____ Date: _____ Checked By: _____ Date: _____

SUMMARY OF RATING

The Load Factor ratings, computed in the _____ and updated in the _____ cycle report in accordance with the FHWA directive dated November 1993 and AASHTO Manual for Condition Evaluation of Bridges, 1994, are as follows:

Note:

Include details of the analysis such as section losses, any assumptions made and the computer program used, etc.

Computer Program Used: _____

Allowable Stresses - MPa (Tons)

<u>Material</u>	<u>Yield</u>
Concrete	XX (f_c)
Reinforcing Steel	XX
Structural Steel	XX

Rating - kN (Tons)

<u>Member</u>	<u>Truck Type</u>	<u>Load Factor</u>	
	<u>kN (Tons)</u>	<u>Inventory</u>	<u>Operating</u>
	Type MS18 - 320.3kN (HS 20 - 36T)	XX	XX
	Type 3 - 222.4kN (25T)	XX	XX
	Type 3S2 - 355.86kN (40T)	XX	XX
	Type 3-3 - 355.86kN (40T)	XX	XX

FORMAT C - When ratings are calculated by working stress only

Structure No.: _____ Project: _____

Name: _____

Rated By: _____ Date: _____ Checked By: _____ Date: _____

SUMMARY OF RATING

The Working Stress ratings, computed in the _____ and updated in the _____ cycle report in accordance with the FHWA directive dated November 1993 and AASHTO Manual for Condition Evaluation of Bridges, 1994, are as follows:

Note:

Include details of the analysis such as section losses, any assumptions made and the computer program used, etc.

Computer Program Used : _____

Allowable Stresses - MPa (Tons)

<u>Material</u>	<u>Yield</u>	<u>Inventory</u>	<u>Operating</u>
Concrete	XX (f_c)	XX	XX
Reinforcing Steel	XX	XX	XX
Structural Steel	XX	XX	XX

Rating - kN (Tons)

<u>Member</u>	<u>Truck Type</u>	<u>Working Stress</u>	
	<u>kN (Tons)</u>	<u>Inventory</u>	<u>Operating</u>
Type MS18	- 320.3kN (HS 20 - 36T)	XX	XX
Type 3	- 222.4kN (25T)	XX	XX
Type 3S2	- 355.86kN (40T)	XX	XX
Type 3-3	- 355.86kN (40T)	XX	XX

SAMPLE S I & A SHEET

New Jersey Department of Transportation

SAMPLE - SUPPLEMENTAL BRIDGE INSPECTION FORM: ITEMS 58-62

Bridge No.	Bridge Name	Inspection Date
1418-154	Rt. I-280 EB over Passaic River	05/17/96

ELE #	ELEMENT DESCRIPTION	E N V	TOTAL QUANTITY	UNITS	QUANT CONDITION STATE 1	QUANT CONDITION STATE 2	QUANT CONDITION STATE 3	QUANT CONDITION STATE 4	QUANT CONDITION STATE 5

012	CONCRETE DECK	3		SM (LF)	000000	000000	000000	000000	009415
107	OPEN GIRDER STEEL	3		LM (LF)	000000	000000	000000	000000	000000
210	PIER WALL REINFORCED	3		LM (LF)	000028	000001	000000	000000	000000
215	ABUTMENT REINFORCED	3		LM (LF)	000074	000005	000003	000000	000000
234	PIER CAP REINFORCED	3		LM (LF)	000042	000000	000000	000000	000000
302	COMPRESSION JOINT SEAL	3		LM (LF)	000040	000030	000060	000000	000000
334	BRIDGE RAILING - METAL	3		LM (LF)	000426	000000	000000	000000	000000
359	SOFFIT (UNDERSUR) OF	3		EA	000000	000001	000000	000000	000000
361	SCOUR (SUBSTRUCTURE)	3		EA	000001	000000	000000	000000	000000
374	STEEL ROCKERS MOVEABLE	3		EA	000000	000008	000002	000000	000000
375	PINNED BEARING - FIXED	3		EA	000007	000003	000000	000000	000000
503	CURBS/SIDE-WALKS	3		LM (LF)	000411	000015	000000	000000	000000
506	WINGWALLS ABUTMENT	3		LM (LF)	000072	000000	000000	000000	000000

Traffic Accidents	On Structure	Under Structure
Avg Bypass Detour Speed	KMPH (MPH)	KMPH (MPH)
Avg Travel Speed	KMPH (MPH)	KMPH (MPH)
Avg Annual Accident Count		
School Bus Route		
Public Transit Route		
Critical Travel Facility		

CoRe Element Remarks

SEISMIC STRUCTURE REPORT (SAMPLE)

Structure Identification

Route: _____ Structure Number: _____ Kilometer (Mile) Post: _____
Structure Name: _____

Seismic Deck Information

Deck Thickness:
Abutment Joint Width:
Pier Joint Width:

Seismic Superstructure Information

Beams Main Span:
Structure Type:

Seismic Bearing Information

Bearing Height:
Number of Anchor Bolts:
Anchor Bolt dimensions:
Pin Diameter:
Shoulder Dimensions:
Alignment Bearing:
Transverse Restraint:

Seismic Substructure Information

Abutment Seat Width:
Pier Seat Width:
Column Reinforcement:
Column Cross Section:
Column Height:
Column F'c:
Longitudinal Reinforcement:
Pile Embedment:
Type of Pier:
Type of Abutment:

PONTIS ELEMENTS CODED FOR STRUCTURE

Element Number	Category	Material	Description
012	DECK	CONCRETE	CONCRETE
359	SMART FLAGS	OTHER	SOFFIT (UNDERSUR) OF DECKS & SLABS (DECK ELEMENTS)
334	DECK	METAL	BRIDGE RAILING - METAL COATED
503	DECK	CONCRETE	CURBS/SIDEWALKS CONCRETE
302	JOINTS	OTHER	COMPRESSION JOINT SEAL
107	SUPERSTRUCTURE	STEEL	OPEN GIRDER STEEL PAINTED
374	BEARINGS	STEEL	STEEL ROCKERS MOVEABLE - EXPANSION
375	BEARINGS	STEEL	PINNED BEARING - FIXED
234	SUBSTRUCTURE	CONCRETE	PIER CAP REINFORCED CONCRETE
210	SUBSTRUCTURE	CONCRETE	PIER WALL REINFORCED CONCRETE
215	SUBSTRUCTURE	CONCRETE	ABUTMENT REINFORCED CONCRETE
506	SUBSTRUCTURE	OTHER	WINGWALLS ABUTMENT (CONC MASONRY TIMBER)
361	SMART FLAGS	OTHER	SCOUR (SUBSTRUCTURE ELEMENTS)

1.41.4 RE-EVALUATION SURVEY REPORT FORMAT - B -

The report of the results of a re-evaluation bridge survey and rating of an existing bridge, performed by or for the Department, shall adhere to the following format:

- (A). **REPORT COVER SHEET:** The report's cover sheet shall utilize the same form as indicated in Format A (see attached sample in Format B).

The cover sheet colors shall be the same as specified under Format A.

The report shall be bound using a standard 3-hole punch type binding.

- (B). **LETTER OF TRANSMITTAL (CONSULTANT PROJECTS ONLY):** The letter of transmittal shall be addressed as shown in Format A (see sample in Format A).

- (C). **TABLE OF CONTENTS:** One page indicating items 1 thru 9 in order shown as follows and providing the page number in the report on which each item starts. All pages in the report shall be numbered (i.e. Cycle No.- Page No.) at the bottom and centered.

Page No.

1. Maps.....	
2. Structural Data	
3. Controlling Ratings	
4. Conclusions and Recommendations	
5. Appendix 1 - a. Structure Inventory & Appraisal Sheets.....	
b. Pontis Data.....	
c. Seismic Data.....	
6. Appendix 2 - Computations	
7. Appendix 3 - Drawings, Soundings and Photographs.....	
8. Appendix 4 - Field Notes with CADD Sketches	
9. Appendix 5 - Underwater Inspection Report/ Other Special Report if applicable.....	

1. **Maps:** Two maps, are required as specified in Format A. If the previous bridge survey report contains up-to-date General Location and Local Maps done to the required specifications, no maps are required.
2. **Structural Data:** A summary of findings and work done shall be included as indicated in Format A.
3. **Controlling Ratings:** The ratings shall be provided as indicated in Format A (give reference to the bridge survey report cycle where the detailed rating computations were made if not calculated in the current cycle report).

4. **Conclusions & Recommendations:** Conclusions shall be provided as indicated in Format A. Also, comment on any major changes in the condition of all components since the previous bridge survey report cycle. If no changes have occurred, include a statement to that effect.
5. **Appendix 1 - Structure Inventory & Appraisal Sheet/PONTIS/Seismic Data:** This section should contain the above listed data forms as indicated in Format A.
6. **Appendix 2 - Computations:** In this section, include computations of ratings for various major bridge components as indicated in Format A.
7. **Appendix 3 - Drawings, Soundings & Photographs:** This section shall contain bridge drawings, sounding sketches, photo location plan sketch and photographs as indicated in Format A.
8. **Appendix 4 - Field Notes:** Provide field notes or CADD sketches as specified in Format A in this section.
9. **Appendix 5 - Underwater Inspection:** In this section, include the diver's inspection report (if applicable) or other additional appendices as specified in Format A.

Sample - For State Bridges
(Consultant Report Cover Sheet)

NEW JERSEY DEPARTMENT OF TRANSPORTATION

BRIDGE RE-EVALUATION SURVEY REPORT OF THE

Structure No. 0226-152
Route I-80
South Summit Avenue over I-80
Hackensack Township
Bergen County

CYCLE NO. 2
AUGUST, 1996

XYZ ENGINEERS, INC.
100 Lincoln Place
East Orange, New Jersey 07018

(FORMAT "B")

**NEW JERSEY DEPARTMENT OF TRANSPORTATION
STRUCTURAL EVALUATION AND BRIDGE MANAGEMENT
RE-EVALUATION BRIDGE SURVEY REPORT**

CYCLE NO._____

STRUCTURAL DATA

Bridge No. _____ Year Built: _____ Reconstr/Widening: _____

Route No. _____ KM (Mile) Post. _____ Length: _____
Width: _____

Name: _____ Date of This
Eval.: _____

_____ By: _____

_____ Date of FCM/Pin Hanger Insp.: _____

By: _____
(Only when Special Inspections are applicable)

Date of Prev.
Eval.: _____

Structure Type: _____

By: _____

_____ Special Equipment Used: _____
(Include Photo)

_____ Date of Underwater Insp: _____

_____ Date of Special Testing: _____

Date of Electr./Mech. Insp.: _____
(Movable Bridges Only)

Overall Condition: _____ Scour Critical: yes/no

**Work
Done:** _____

Component/ Material	Cond. Rating	General Remarks
------------------------	-----------------	-----------------

DECK/TOP OF
ROADWAY

APPROACHES

Component/ Material	Cond. Rating	General Remarks
------------------------	-----------------	-----------------

SUPERSTRUCTURE

SUBSTRUCTURE

CHANNEL/ WATERWAY

SAFETY FEATURES

DECK GEOMETRY

UTILITIES

The minimum vertical underclearance is _____ under _____

The lateral clearance are: Left: _____ Right: _____

For waterways include horizontal and vertical clearances of the main channel span.

CONTROLLING RATINGS (From _____ Cycle Report):

Computer Program Used: _____

Based on the *load factor method of analysis, the following load ratings have been computed:

		Truck Type - kN (Tons)				
Controlling Member		MS18	(HS 20)	3	3S2	3-3
		320.3kN (36T)	(25T)	222.4kN (40T)	355.86kN (40T)	355.86kN
End Floorbeam	Inventory Ratings	XX		XX	XX	XX
Interior	Operating Ratings	XX		XX	XX	XX
NJDOT Design Manual for Bridges and Structures						1.41-25

Stringer

The inventory/operating ratings are low due to (give explanation/reasons).

- Working Stress or load factor/working stress could also be substituted depending on the method used to calculate the ratings.

CONCLUSIONS AND RECOMMENDATIONS:

For explanation of the requirements for this section, refer to Format A.

Note: The following area(s) or structural member(s) should be inspected on an interim basis at the frequency indicated:

A.

B.

C.

1.41.5 RE-EVALUATION SURVEY REPORT FORMAT - C -

The report of the results of a re-evaluation bridge survey and rating of an existing bridge, performed by or for the Department, shall adhere to the following format:

- (A). **REPORT COVER SHEET:** The report's cover sheet shall utilize the same form as indicated in Format A (see attached sample in Format B).

The cover sheet colors shall be the same as specified under Format A.

The report shall be bound using a standard 3-hole punch type binding.

- (B). **LETTER OF TRANSMITTAL (CONSULTANT PROJECTS ONLY):** The letter of transmittal shall be addressed as shown in Format A (see sample in Format A).

- (C). **TABLE OF CONTENTS:** The table of contents shall utilize the same form as shown under Format B.

1. **Maps:** Two maps are required as specified in Format A. If the previous bridge survey report contains up-to-date General Location and Local Maps done to the required specifications, no maps are required.

2. **Structural Data:** A summary of the work done since the previous bridge survey shall be included as per the attached format. The remaining items in this format are self-explanatory.

3. **Controlling Ratings:** The ratings shall be provided as indicated in Format A (give reference to the bridge survey report cycle where the detailed rating computations were made).

4. **Conclusions & Recommendations:** State the overall condition of the structure (consistent with SI&A Item 67) and include a paragraph summarizing the conditions of the various components to justify their being coded as they are. For large or complex structures, it may be necessary to include one paragraph for each component rather than one long paragraph. If an underwater inspection has been conducted and no repairable defects were discovered, the underwater inspection should be noted here. If repairable defects were discovered by the diver, appropriate remedial repairs should be included in the report.

Conclusions shall be provided as indicated in Format A. Also, comment on any major changes in the condition of all components since the previous bridge survey report cycle. If no changes have occurred, include a statement to that effect.

5. **Appendix 1 - Structure Inventory & Appraisal Sheet/PONTIS/Seismic Data:** This section should contain the above listed data forms as indicated in Format A.

6. **Appendix 2 - Computations:** In this section, include computations of ratings for various major bridge components as indicated in Format A.
7. **Appendix 3 - Drawings, Soundings & Photographs:** This section shall contain bridge drawings, sounding sketches, photo location plan sketch and photographs as indicated in Format A.
8. **Appendix 4 - Field Notes:** Provide field notes or CADD sketches as specified in Format A in this section.
9. **Appendix 5 - Underwater Inspection:** In this section, include the diver's inspection report (if applicable) or other additional appendices as specified in Format A.

(FORMAT "C")

NEW JERSEY DEPARTMENT OF TRANSPORTATION
STRUCTURAL EVALUATION AND BRIDGE MANAGEMENT
RE-EVALUATION BRIDGE SURVEY REPORT

CYCLE NO. _____

STRUCTURAL DATA

Bridge No. _____ Year _____ Built: _____
Reconstr/Widening: _____

Route No. _____ km (Mile) Post _____ Length: _____
Width: _____

Name: _____ Date of This
Eval.: _____

By: _____

Date of FCM/Pin Hanger Insp.: _____

By: _____
(Only when Special Inspections are applicable)

Structure Type: _____ Date _____ of _____ Prev.
Eval.: _____

By: _____

Special Equipment
Used: _____
(Include Photo)

Date of Underwater Insp: _____

Date of Special Testing: _____

Date of Electr./Mech. Insp.: _____
(Movable Bridges Only)

Overall Condition: _____ Scour Critical: yes/no

Work
Done: _____

CONTROLLING RATINGS (see Format B for the requirements of this section)

CONCLUSIONS AND RECOMMENDATIONS:

The overall condition of the structure is _____ due to _____.

The deck is in _____ condition due to _____. The approaches are in _____ condition due to _____. The superstructure is in _____ condition due to _____. The substructure is in _____ condition due to _____. The channel is in _____ condition due to _____. (List the significant defects which are the main reasons for the condition ratings of the above structural elements. If an element has no significant defects - i.e., coded 6 or higher, it should be deleted from the above).

Since _____ the _____ previous _____ inspection

(Give brief description of significant changes in the condition of the various components. Do not include work done in this section.)

((Give a brief description and location of the fracture critical members or pin hanger details (specify when FCM's are internally redundant - i.e., riveted)). Also, comment if bridge is scour critical and if countermeasures or monitoring devices have been provided/installed.

For an explanation of the remainder of this section, refer to Format A.

1.41.6 INTERIM SURVEY REPORT FORMAT - D -

The report of the results of an interim bridge survey and rating of an existing bridge, performed by or for the Department, shall adhere to the following format:

- (A). **REPORT COVER SHEET:** The report's cover sheet shall include the bridge number, name, route number, municipality, county and the month and the year of the bridge survey (see attached sample in Format D).

The report shall be bound using a standard 3-hole punch type binding.

- (B). **LETTER OF TRANSMITTAL (CONSULTANT PROJECTS ONLY):** The letter of transmittal shall be addressed as shown in Format A (see sample in Format A):

- (C). **TABLE OF CONTENTS:** One page indicating items 1 thru 8 in order shown on the following page and providing the page number in the report on which each item starts. All pages in the report shall be numbered at the bottom and centered.

Page No.

1. Structural Data	
2. Controlling Ratings	
3. Reason for Interim Survey	
4. Current Condition	
5. Conclusions and Recommendations	
6. Appendix 1 - a. Structure Inventory & Appraisal Sheets	
b. Pontis Data	
7. Appendix 2 - Computations	
8. Appendix 3 - Drawings, Soundings and Photographs	

1. **Structural Data:** A summary of findings and work done shall be included as per the attached format. The items in this format are self-explanatory.
2. **Controlling Ratings:** The ratings should include the controlling member and controlling Inventory and Operating Ratings of the bridge.
3. **Reasons for Interim Survey:** Indicate specifically the areas or members of the bridge requiring an interim inspection. These areas could be locations of deterioration such as loss of concrete under a bearing or a tilted wingwall. They also could be structure members with low operating ratings (list all members with low operating ratings) or fracture critical members.
4. **Current Condition:** Indicate the current condition of the items identified in the previous section. Also, state if any changes have occurred since the last survey (in-depth or interim).
5. **Conclusions & Recommendations:** Conclusions resulting from the interim bridge evaluation survey regarding the items inspected should be given here.

Also, include possible explanation of the causes of any inadequacies found. If the bridge is posted, state so, giving the posted limits (load or speed) and should be referenced to photos clearly showing the posted weight or speed limits.

Make specific new recommendations for safety improvements, major repair work (i.e. structure rehabilitation and/or replacement, raising superstructure, bridge widening, etc. to correct Structurally Deficient/Functionally Obsolete conditions) and other repair work to correct significant defects, deterioration and inadequacies found during this interim bridge survey. The intent is to list any new repairs which are needed, not to repeat the recommendations from the latest bridge evaluation survey report. If no new repairs are necessary, this should be stated.

The recommendations should be specific about the location of defects and the methods of repair. The recommendations for other repair work should be listed in the order of priority. Each recommendation should be referenced to the photos. For major repair work, provide cost estimates. For other repair work, provide quantities only.

6. **Appendix 1 - Structure Inventory & Appraisal Sheet/PONTIS/Seismic Data:** This section should contain the above listed data forms as indicated in Format A.
7. **Appendix 2 - Computations:** In this section, include computations of ratings for various major bridge components as indicated in Format A.
8. **Appendix 3 - Drawings, Soundings & Photographs:** This section shall contain bridge drawings, sounding sketches, photo location plan sketch and photographs as indicated in Format A with the following exceptions:

Photographs of one elevation and plan view plus all areas of the bridge inspected during the interim bridge evaluation survey are required.

Sample - For State Bridges
(Consultant Report Cover Sheet)

NEW JERSEY DEPARTMENT OF TRANSPORTATION

INTERIM EVALUATION SURVEY REPORT OF THE

Structure No. 0226-152
Route I-80
South Summit Avenue over I-80
Hackensack Township
Bergen County

AUGUST, 1996

XYZ ENGINEERS, INC.
100 Lincoln Place
East Orange, New Jersey 07018

(FORMAT "D")

**NEW JERSEY DEPARTMENT OF TRANSPORTATION
STRUCTURAL EVALUATION AND BRIDGE MANAGEMENT
INTERIM BRIDGE SURVEY REPORT**

FREQUENCY:_____ MONTHS

STRUCTURAL DATA

Bridge No. _____ Year Built: _____
Reconstr/Widening: _____
Route No. _____ km (Mile) Post _____ Length: _____ Width: _____
Name: _____ Date of This Eval.: _____

_____ By: _____

_____ *Date of Previous Interim
Survey: _____

Structure Type: _____ *By: _____

_____ (*Use only if there was another interim survey
after the last routine survey.)

_____ Date of Last Routine
Eval: _____

_____ By: _____

Special
Equipment: _____
(Include Photos)

Overall Condition: _____ **Scour Critical:** yes/no

**Work
Done:** _____

REASONS FOR INTERIM SURVEY:

CURRENT CONDITION OR CHANGES IN ITEMS INSPECTED:

CONCLUSIONS AND RECOMMENDATIONS:

We recommend that the following repairs or rehabilitation be made to retard further deterioration, preserve the structural integrity of the bridge, improve safety and extend its useful

life: _____

In addition to any recommendations noted here, all of the recommendations from the previous reports (routine or interim) are still in effect if not already completed.

Next interim inspection is recommended at _____ month intervals.

1.41.7 GUIDELINES FOR CADD BRIDGE EVALUATION SURVEY FIELD INSPECTION DRAWINGS

A. GENERAL

Recording of the field bridge survey data on computer generated drawings/sketches are intended to essentially replace the existing handwritten field notes and sketches.

The purpose of utilizing CADD drawings in bridge inspection is two fold:

1. To provide a visual representation of the bridge conditions in place of verbal descriptions in the bridge survey report (field notes).
2. To facilitate Electronic Storage and updating of bridge conditions and clearances observed during subsequent bridge survey cycles.

Using the existing bridge plans, base plans for various bridge components will be developed for the purpose of taking notes during the field inspection as well as for final report presentation. All base plans will be prepared on 297 by 420 millimeters (11 by 17 inches) sheets, or for small bridges, on 210 by 297 millimeters (8 1/2 by 11 inches) sheets and made appropriately proportioned taking advantage of CADD flexibilities. For example, varying scales can be used lengthwise and widthwise, etc. North arrows should be oriented vertically or to the left when the CADD drawing is placed in the report.

The Department's CADD system is based on Intergraph Microstation. Therefore, it is required that CADD drawings be developed using Intergraph Microstation or Intergraph Microstation PC software programs. However, it is acceptable to use other CADD software submitted in Intergraph Microstation. All CADD drawing files must be submitted to the Department with the final report and each bridge must be submitted on a separate diskette. The diskette size must be 90 millimeters (3 1/2 inches) and formatted on DOS. Two (2) copies of each diskette are required.

B. TYPICAL DRAWINGS

It is recommended that the same approximate scale be used for the base plan of the following drawing categories 1, 2 and 3:

1. Clearances, Soundings and Photo Locations:

Use one sheet for any bridge up to approximately 150 meters (492 feet) in length. The plan will show the general bridge plan (roadway), elevation view and all features it crosses (highways, waterways, railroad, etc.). All the measurements such as minimum and maximum vertical and lateral underclearances, lane widths, curb-to-

curb deck width, span length, sidewalk or median widths, etc. should be field verified and recorded. All clearances and photo locations should be shown on the plan view while the soundings should be shown on the elevation view. The sounding plot should also include the plot from the initial sounding survey and a statement as to whether or not the channel profile has changed since the previous survey. When the length of the structure makes the scale of the drawing too small for plotting soundings or showing clearances, separate drawings should be provided. NOTE: Soundings must be done in accordance with the current edition of the "Underwater Inspection and Evaluation of New Jersey Bridges Guidelines Manual" and subsequent modifications.

2. Deck:

Approaches, approach guide rails and at least two (2) end spans (deck) should be shown on one sheet. For multi-span bridges (viaducts), use additional sheets for the top of the deck as necessary.

Underdeck CADD sheets should also show the framing (thin or dashed line) when applicable to facilitate the location of defects relative to the stringers, floorbeams, diaphragms, etc.

3. Superstructure:

Layered framing, if applicable, should be used to clearly show the deterioration of a member in each layer (stringer, floorbeams, etc.). The number of sheets required will depend on the length of the structure, number of spans and the complexity of the superstructure. Bearings should be shown on the bridge seat plan.

For movable bridges, CADD drawings for trusses and/or towers should be part of the superstructure.

4. Substructure:

These drawings should show the breastwall, bridge seat with (or without) bearing pedestals, wingwalls (projected), backwall, slope protection or all four faces of a pier to a suitable approximate scale. Any other substructure features (retaining walls, etc.) should be included as a vertical (or horizontal) projection adjacent to wingwalls.

For abutments, 1 (one) sheet per bridge should be used.

For piers, the number of sheets required will depend on the configuration and the number of piers. Normally three (3) piers can be shown on each sheet.

Abutment and pier plans will be prepared individually by taking advantage of similarities, if any.

For bridges with complex framing, bridges over five spans, or structures with severe deterioration, a summary sheet should include the description of the

major findings of each component (deck, superstructure, substructure, channel, etc.) to supplement the CADD information. Also, the maximum length of bridge covered per sheet should be in the range of 45 meters or one to three spans as determined by the Engineer with the approval of the Project Manager.

Examples of typical CADD drawings which are deemed to be acceptable to the Department are attached following the Standard Defect Codes. These drawings are provided to show a representation of what the Department expects in CADD drawings.

C. STANDARD DEFECT CODES

The following guidance is provided to indicate common defects with codes on sketches. Codes used on a sheet should have their description given at the bottom left hand part of the sheet.

Defect codes shall be a three digit code. The first digit shall correspond to the material category based on the following:

C - Concrete	T - Timber
S - Steel	M - Misc.

The second digit describes the type of defect, e.g. scaling, rusting, erosion, etc.

The third digit shall indicate the severity of the defect.

Codes will begin with the letter "A" indicating less severe or minor defects with alphabetically increasing severity, e.g.:

a. Cracks:	A = Fine B = Medium C = Wide
b. Spalls	A = Incipient Spall B = Small Spall C = Large Spall
c. Scaling	A = Light B = Moderate C = Severe

The following is a list of codes developed for each category which by no means should be considered as a complete listing. It only serves as a guide and covers the most common defects and should be supplemented by full descriptions of other defects not easily categorized.

Also, where the bridge inspector believes further elaboration of a defect designated by the code is necessary, an additional sketch of the noted location (i.e. cross section of a beam, measurement of the defect, % loss of bearing area, etc.) should be provided to illustrate the defect observed.

Inspectors are encouraged to use additional notes as needed to describe other

defects or to further elaborate and locate defects described with codes.

It is very important to quantify the defects such as indicating the length of medium and wide cracks or areas of spalled and scaled concrete to facilitate comparison in future surveys and preparation of estimates. Make sure to include concrete patched spalled areas in the deck separately.

DEFECT SUMMARY

CONCRETE (C)

Defect Code	Type Defect	A	Severity B	C
1	Cracking	Fine	Medium	Wide
2	Cracking with Efflorescence	Fine	Medium	Wide
3	Efflorescence/ Exudation	Light	Moderate	Heavy
4	Scaling	Light	Moderate	Severe
5	Spalling	Small	Large	Large (+)
6	Spalling with Exposed Steel	Small	Large	Large (+)
7	Encasement Deterioration	Minor spalls	Det. w/ cracks	Det. w/ Exposed Steel

DEFECT SUMMARY

STEEL (S)

Defect Code	Type Defect	A	Severity B	C	D
1	Paint Failure	Random Peeling	Up to 3%	Up to 10%	>10%
2	Rusting	Spot	Light	Moderate	Severe
3	Corrosion with Up to Section Loss	Up to 10%	Up to 20%	Up to 30%	>30% (Specify %)
4	Collision Damage	Minor Scrapes	Local Buckling	Major Deform. No need for NDT.	Major Deform. NDT required

Please provide location and description of Fatigue Details. Use letters as per AASHTO Details.

DEFECT SUMMARY

TIMBER (T)

Defect	Type	Severity
--------	------	----------

Code	Defect	A	B	C
1	Decay/Rotting	Minor	Moderate	Severe
2	Checks	Fine	Medium	Wide
3	Splits	Minor	Moderate	Severe
4	Section Loss	Up to 10%	Up to 20%	Over 20% (Specify %)
5	Deflection	Minor	Moderate	Severe

DEFECT SUMMARY

MISCELLANEOUS (M)

Defect Code	Type Defect	A	Severity B	C
1	Approach Settlement	Up to 13 MM	Up to 25 MM (Specify Amt.)	> 50 MM
2	Appr. Railing Broken/Damaged	Minor	Moderate	Severe
3*	Excessively Expanded Bearing	Minor	Moderate	Severe
4*	Excessively Contracted Bearing	Minor	Moderate	Severe
5	Joint Deterioration	Minor	Moderate	Severe

*Specify degree of tilt on rocker bearings and temperature of steel

